Remarks

The Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and following remarks. Upon entry of the present amendment, claims 1-10, 12, 17-23, 25, 30, 39, 40, 45, 47, 48, 50-57, 59-62 and 65-68 are pending. Claims 1-10, 12, 17-23, 25, 30, 39, 40, 45, 47, 48, 50-57, and 59-62 were rejected in the final Office action. No claims have been allowed. Claims 11, 13-16, 24, 26-29, 31-38, 41-44, 46, 49, 58, 63 and 64 have been canceled without prejudice.

Cited Art

In the final Office action, the Examiner cites the following references in rejecting the claims under 35 U.S.C § 103(a).

1. U.S. Publication No. 2003/0053541 to Sun et al. ("Sun publication");
2. U.S. Patent No. 5684602 to Tsuchiya et al. ("Tsuchiya patent");
3. U.S. Patent No. 6332043 to Ogata ("Ogata patent"); and
4. U.S. Patent No. 6125147 to Florencio et al. ("Florencio patent").

Response to Examiner's Remarks in the Final Office Action

In the final Office action, the Examiner sets forth a broad interpretation of the claim term "processing cycles available" as potentially encompassing, for example, "a routine that the CPU would normally perform but could not due to other elements of the system" and "interaction between a CPU and other circuit in a computing system." Final Office action, page 2. The Applicants acknowledge the Examiner's broad interpretations of the claim terms "processing cycles available" and "processing power available."

Later, the Examiner writes, "a review of the claim limitation should be changed to identify the post-processing strength being a determining factor into determining if the present invention is able to post-process a decoded signal for higher image quality." Final Office action, page 4. To expedite prosecution, the Applicants have added details to claim 1 about filter information that varies depending on quality or bitrate of the encoded video data. This filter information and a filter type selection are output as control information for adjusting post-processing filtering after decoding of the encoded video data. With the control information, a decoder can adjust which post-processing filtering to perform, using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data. Moreover, within settings defined by the control information, the decoder can adjust the filter operations depending on processing cycles available to the decoder.

The Applicants have also added "filter information" details to independent claims 17, 18 and 30.

Response to Rejections of Claims 1-12, 17-25, 30, 39, 40, 48, 53-56 and 59-61 Under 35 U.S.C. § 103(a)

In the final Office action, the Examiner rejects claims 1-12, 17-25, 30, 39, 40, 48, 53-56 and 59-61 under 35 U.S.C § 103(a) as being unpatentable over the Sun publication in view of the Tsuchiya patent and Ogata patent. The Applicants respectfully disagree with the rejections.

Claim 1

Claim 1, as amended, recites:

> parameterizing control information other than the encoded video data, including:
>
> setting a filter type selection that identifies one or more of plural different types of filters for post-processing filtering, wherein the control information includes the filter type selection; and
>
> setting filter information that varies depending on quality or bitrate of the encoded video data, wherein the control information further includes the filter information, and wherein the filter information is different than the filter type selection;
>
> wherein the control information facilitates adjustment by a decoder of the post-processing filtering of the video data after decoding of the encoded video data, the adjustment including:
>
> using the filter type selection to identify the one or more types of filters; and
>
> using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data, wherein the filter operations are for the identified one or more types of filters, and wherein, within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on processing cycles available to the decoder;
>
> outputting the encoded video data as well as the control information.

Claim 1 is directed to encoder-side operations that include parameterizing and outputting control information. The control information includes a filter type selection (which identifies one or more of multiple different types of filters for post-processing filtering) as well as filter information that varies depending on quality or bitrate of the encoded video data. Using the control information, a decoder can later adjust post-processing filtering by using the filter type selection to identify the one or more filters, and using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data. In addition, within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on processing cycles available to the decoder.

For example implementations, the Application provides examples of control information that facilitates adjustment of post-processing filter operations depending on processing cycles available to the decoder, within settings defined by control information for the post-processing filtering:

> Another type of control information indicates a post-processing level (i.e., strength) of de-blocking, de-ringing, and/or other filtering. Bitstream-controlled post-processing is particularly useful when the control information represents the maximum allowed post-processing level. For example, suppose a higher level indicates stronger filtering. If the author indicates post-processing level 3 for a given video frame, the decoder may apply post-processing of level 0, 1, 2, or 3 to the given frame, but not 4 or higher. This approach provides some flexibility. If a software decoder does not have enough CPU cycles available to apply level 3 for the frame, it may only apply level 2, etc. At the same time, using a maximum allowed level achieves the main goal – ensuring that the video will never be excessively blurred by post-processing. A smart author sets the maximum allowed level to 0 (i.e., no post-processing) or a low level when the decoded video is already of high quality, and sets a higher level when the decoded video presents more blocking and ringing artifacts.
>
> Alternatively, instead of maximum allowed levels, the control information represents exact levels. Such control information specifies a mandatory level of post-processing filtering, which is useful when the author wants to control post-processing exactly. Or, the control information represents minimum allowed levels. This is useful when the author wants to guarantee that at least a minimum level of post-processing filtering is applied, for example, for very low bitrate video.

Application, at page 25, line 17 to page 26 line 12; *see also* page 23, lines 2-5 and page 24, lines 6-15.

The Sun publication, Tsuchiya patent and Ogata patent, taken separately or in combination, fail to teach or suggest the above-cited language of claim 1. In rejecting claim 1, the Examiner acknowledges that the Sun publication does not teach "adjusting being based at least in part on processing cycles." Final Office action, page 4. The Sun publication is even further from teaching or suggesting control information that facilitates decoder-side adjustment of post-processing filtering depending on available processing cycles *within settings defined by output control information for the post-processing filtering.* In particular, the Sun publication fails to teach or suggest control information that facilitates decoder-side adjustment that includes (as recited in claim 1):

> using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data, wherein the filter operations are for the identified one or more types of filters, and wherein, within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on processing cycles available to the decoder.

The Ogata patent also fails to teach or suggest control information that facilitates such adjustment. In the Office action, the Examiner therefore cites the Tsuchiya patent, but the Tsuchiya patent fails to remedy the deficiencies of the Sun publication and Ogata patent. Even if, for the sake of argument, the Tsuchiya patent describes adjustment based on available processing cycles (as the Examiner contends), the Tsuchiya patent still fails to teach or suggest control information that facilitates decoder-side adjustment of post-processing filtering depending on available processing cycles *within settings defined by output control information for the post-processing filtering.* In particular, the Tsuchiya patent, taken separately or in combination with the Sun publication and Ogata patent, fails to teach or suggest the language of claim 1 that is quoted immediately above.

For at least these reasons, the Sun publication, Ogata patent and Tsuchiya patent, taken separately or in combination, fail to teach or suggest the above-cited language of claim 1.

Claims 17, 18 and 30

Claim 17, as amended, recites:

> with the computing device that implements the video encoder, parameterizing control information other than the encoded video data, including:
>
> setting a filter type selection that identifies one or more of plural different types of filters for post-processing filtering, wherein the control information includes the filter type selection; and
>
> setting filter information that varies depending on quality or bitrate of the encoded video data, wherein the control information further includes the

filter information, and wherein the filter information is different than the filter type selection;

wherein the control information facilitates adjustment by a decoder of the post-processing filtering of the video data after decoding, the adjustment including using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data, wherein the filter operations are for the one or more types of filters identified with the filter type selection, and wherein, within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on processing power available to the decoder; and

with the computing device that implements the video encoder, outputting the encoded video data as well as the control information.

Claim 18, as amended, recites:

receiving encoded video data in a bitstream as well as control information in the bitstream for controlling post-processing filtering, the control information comprising data in the bitstream other than the encoded video data, wherein the control information includes:

a filter type selection that identifies one or more of plural different types of filters for the post-processing filtering; and

filter information that varies depending on quality or bitrate of the encoded video data, wherein the filter information is different than the filter type selection;

decoding the encoded video data;

determining available processing cycles; and

adjusting the post-processing filtering on the decoded video data, the adjustment including using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data, wherein the filter operations are for the one or more types of filters identified with the filter type selection, and wherein, within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on the processing cycles available to the decoder.

Claim 30, as amended, recites:

receiving encoded video data in a bitstream as well as control information in the bitstream for controlling post-processing filtering, the control information comprising data in the bitstream other than the encoded video data, wherein the control information includes:

a filter type selection that identifies one or more of plural different types of filters for the post-processing filtering; and

filter information that varies depending on quality or bitrate of the encoded video data, wherein the filter information is different than the filter type selection;

decoding the encoded video data;

> using the filter type selection to select one or more of plural different types of filters for post-processing filtering;
>
> determining available processing power; and
>
> adjusting the post-processing filtering on the decoded video data, including using the filter information to determine filter operations that are appropriate for the quality or bitrate of the encoded video data, wherein the filter operations are for the selected one or more types of filters, and wherein, within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on the processing power available to the decoder

In the final Office action, the Examiner rejects independent claims 17, 18 and 30 using the same arguments as in the rejection of claim 1. Final Office action, pages 6-7. For at least the reasons explained above with respect to the claim 1 language "within settings defined by the control information for the post-processing filtering, the decoder can adjust the filter operations depending on the processing cycles available to the decoder," the Sun publication, Ogata patent and Tsuchiya patent, taken separately or in combination, fail to teach or suggest the above-cited language of claims 17, 18 and 30.

For at least these reasons, claims 17, 18 and 30 should be allowable.

Claims 2-12, 19-25, 39, 40, 48, 53-56 and 59-61

Each of dependent claims 2-12, 19-25, 39, 40, 48, 53-56 and 59-61 depends directly or indirectly from claim 1, 17, 18 or 30 and, for at least that reason, should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

Response to Rejections of Claims 45-47, 49-52, 57, 58 and 62 Under 35 U.S.C. § 103(a)

In the final Office action, the Examiner rejects claims 45-47, 49-52, 57, 58 and 62 under 35 U.S.C § 103(a) as being unpatentable over the Sun publication in view of the Tsuchiya patent, the Ogata patent and the Florencio patent. The Applicants respectfully disagree because the cited art does not teach or suggest at least one element of each of these claims.

Each of claims 45 and 46 depends from claim 1, each of claims 47 and 49-52 depends from claim 18, each of claims 57 and 58 depends from claim 17, and claim 62 depends from claim 30. As explained above, the Sun publication, Ogata patent and Tsuchiya patent, taken separately or in combination, do not teach or suggest the above-cited language of claims 1, 17, 18, and 30, respectively. The Florencio patent fails to remedy this shortcoming. The Florencio patent describes "a method and apparatus for reducing breathing artifacts" (*see* Florencio patent, at Abstract) but, taken separately or in combination with the Sun publication, Ogata patent and Tsuchiya patent, still fails to teach or suggest the above-cited language of claims 1, 17, 18, and 30, respectively.

The Applicants note the Examiner cites parts of the Florencio patent against the "determining available CPU cycles for applying post-processing filtering" language of claim 47. Final Office action, page 10. The Applicants respectfully disagree. The cited parts of the Florencio patent (element 230 of Figure 2, 7:9-36) describe a controller 230 including a microprocessor that executes software routines. The cited parts of the Florencio patent fail to teach or suggest, however, adjusting processing based on available CPU cycles.

For at least these reasons, dependent claims 45-47, 49-52, 57, 58 and 62 should be allowable. The Applicants will not belabor the merits of the separate patentability of these dependent claims.

Conclusion and Request for Interview

The claims in their present form should be allowable. Such action is respectfully requested. Should any issues remain, the Applicants invite the Examiner to telephone the undersigned attorney.

Respectfully submitted,

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